BIOL3833

Week 3b: Ion channel function

\[ V = I \times R \]

\[ I = G \times V \]
The equation for current is given as:

\[ I_{ion} = (V_m - E_{ion}) \times G_{ion} \]

And the equation for membrane potential is:

\[ V_m = \frac{g_K E_K + g_{Na} E_{Na}}{g_K + g_{Na}} \]

What is G?
Ion channels!

• Today – Analysis of ion channel function
• Tuesday – Simulations: voltage clamp experiments
• Thursday – Structure of ion channels

Ion channel function

What do we care about?
We care about:

- Activation, Deactivation, Inactivation, Recovery
- For each of these processes
  - Voltage dependence
  - Kinetics

How do we study ion channel function?

Voltage Clamp
Patch clamp:

Patch movie
The opening and closing of single ion channels

Sodium Channels

Potassium Channels

(A) UNITARY Na⁺ CURRENTS

(A) UNITARY K⁺ CURRENTS
Interpreting voltage clamp “families”